1. An improved apparatus for introducing a high flow rate of a gaseous reactant which contains or picks up solid particles into a tubular reactor comprising:

a cylindrical gaseous reactant injection chamber having a closed forward end and a rearward end adapted to be sealingly connected to the upstream end of said tubular reactor and having an annular opening around the periphery thereof;

a first annular plenum chamber having an outside wall and at least one side sealingly attached to the exterior of said gaseous reactant injection chamber, said first plenum chamber having an annular side outlet and having a tangential inlet for receiving a high flow rate stream of said gaseous reactant containing solid particles and for causing said stream to swirl therein;

a second annular plenum chamber having an outside wall and sides and having a larger diameter than said first plenum chamber sealingly attached to the exterior of said gaseous reactant injection chamber, said second plenum chamber having an annular side inlet sealingly attached to said annular side outlet of said first plenum chamber;

an annular slot formed within said second plenum chamber adjacent to the side thereof opposite from said annular side inlet thereof, said annular slot being sealingly attached over said annular opening in said gaseous reactant injection chamber and extending to near the outside wall of said second plenum chamber; and

a plurality of spaced vanes attached within said annular slot to thereby form two or more radial slots therein.

2. The apparatus of claim 1 which further comprises a gaseous reactant deflector disposed within said cylindrical gaseous reactant injection chamber for aligning and distributing said gaseous reactant therein whereby it flows through the center of said tubular reactor.

3. The apparatus of claim 1 wherein said gaseous reactant is heated oxygen and the reaction carried out in said tubular reactor is the high temperature production of titanium dioxide.

4. The apparatus of claim 3 which further comprises a first conduit sealingly extending into said cylindrical gaseous reactant injection chamber and positioned coaxially therewith for discharging a reactor scouring medium therein.

5. The apparatus of claim 4 which further comprises a second conduit sealingly extending into said cylindrical gaseous reactant injection chamber and positioned coaxially therewith and with said first conduit for discharging auxiliary fuel therein.

6. The apparatus of claim 5 which further comprises at least one cooling water jacket sealingly attached to the exterior of said cylindrical gaseous reactant injection chamber.

7. The apparatus of claim 6 which further comprises a heat shield disposed in said cylindrical gaseous reactant injection chamber between said annular opening therein and said closed forward end thereof.

8. The apparatus of claim 1, the cylindrical gaseous reactant chamber comprising a cylindrical corrosion resistant member at the rear end thereof.

9. The apparatus of claim 8, said cylindrical corrosion resistant member being formed of a ceramic material.

10. The apparatus of claim 9, wherein said ceramic material is selected from the group consisting of alumina, silica, alumina-silica, silicon carbides, silicon nitride and aluminum nitrides.

11. The apparatus of claim 10, wherein said ceramic material is selected from the group consisting of silicon nitrides and aluminum nitrides.

12. The apparatus of claim 11, wherein said ceramic material is a silicon-aluminum oxy nitride.

13. An improved apparatus for introducing a high flow rate of a gaseous reactant which contains or picks up solid particles into a tubular reactor comprising:

a cylindrical gaseous reactant injection chamber having a forward end and a rearward end adapted to be sealingly connected to the upstream end of said tubular reactor and having an annular opening formed therein around the periphery thereof, said annular opening having a plurality of spaced vanes disposed therein to thereby form two or more radial slots therein; and

an annular plenum chamber having an outside wall and sides sealingly attached to the exterior of said cylindrical gaseous reactant injection chamber over said annular opening, having a tangential inlet for receiving a high flow rate stream of said gaseous reactant containing solid particles and for causing said gaseous reactant to swirl in said plenum chamber, said annular plenum chamber also including a tangential boot formed therein downstream from said tangential inlet for catching said solid particles contained in said gaseous reactant.

14. The apparatus of claim 13 which further comprises a conduit attached within said plenum chamber having one end extending into said boot and the other end extending into one of said radial slots in said cylindrical gaseous reactant injection chamber.

15. The apparatus of claim 13 wherein said gaseous reactant is heated titanium tetrachloride gas and the reaction carried out in said tubular reactor is the high temperature production of titanium dioxide.

16. The apparatus of claim 15 which further comprises an internal liner formed of corrosion resistant material disposed in said annular plenum chamber.

17. The apparatus of claim 15 wherein said annular opening in said cylindrical gaseous reactant injection chamber and said radial slots formed therein are angled towards said rearward end thereof.

18. The apparatus of claim 13, wherein said cylindrical gaseous reactant chamber has a wear plate comprised of a corrosion resistant material at the rear end thereof.

19. The apparatus of claim 18, wherein said corrosion resistant material is formed of a ceramic material.

20. The apparatus of claim 19, wherein said ceramic material is selected from the group consisting of alumina, silica, alumina-silica, silicon carbides, silicon nitrides and aluminum nitrides.

21. The apparatus of claim 20 wherein said ceramic material is selected from the group consisting of silicon nitrides and aluminum nitrides.

22. The apparatus of claim 21 wherein said ceramic material is a silicon-aluminum oxy nitride.

23. An improved apparatus for introducing high flow rates of oxygen and titanium tetrachloride gas which contain or pick up solid particles into a tubular reactor comprising:

a cylindrical oxygen injection chamber having a closed forward end and a rearward end and having an annular opening around the periphery thereof;

a first annular plenum chamber having an outside wall and at least one side sealingly attached to the exterior of said cylindrical oxygen injection chamber, said first plenum chamber having an annular side outlet and having a tangential inlet for receiving a high flow rate stream of heated oxygen containing solid particles and for causing said stream to swirl therein;

a second annular plenum chamber having an outside wall and sides and having a larger diameter than said first plenum chamber sealingly attached to the exterior of said oxygen injection chamber, said second plenum chamber having an annular side inlet sealingly attached to said annular side outlet of said first plenum chamber;

an annular slot formed within said second plenum chamber adjacent to the side thereof opposite from said annular side inlet thereof, said annular slot being sealingly attached over said annular opening in said cylindrical oxygen injection chamber and extending to near the outside wall of said second plenum chamber;

a plurality of spaced vanes attached within said annular slot to thereby form two or more radial slots therein;

a cylindrical titanium tetrachloride gas injection chamber having a forward end sealingly connected to said rearward end of said cylindrical oxygen injection chamber and a rearward end connected to the upstream end of said tubular reactor and having an annular slot formed therein around the periphery thereof, said annular slot having a plurality of spaced vanes disposed therein to thereby form two or more radial slots therein; and

a third annular plenum chamber having an outside wall and sides sealingly attached to the exterior of said cylindrical titanium tetrachloride gas injection chamber,

having a tangential inlet for receiving a high flow rate stream of heated titanium tetrachloride gas containing solid particles and for causing said titanium tetrachloride gas to swirl in said plenum chamber, said third annular plenum chamber also including a tangential boot formed therein downstream from said tangential inlet for catching said solid particles contained in said titanium tetrachloride gas.

24. The apparatus of claim 23 which further comprises a conduit attached within said third plenum chamber having one end extending into said boot and the other end extending into one of said radial slots in said cylindrical titanium tetrachloride gas injection chamber.

25. The apparatus of claim 23 which further comprises an oxygen deflector disposed within said cylindrical oxygen injection chamber for distributing and aligning said oxygen therein whereby it flows through the center of said tubular reactor.

26. The apparatus of claim 23 which further comprises a first conduit sealingly extending into said cylindrical oxygen injection chamber and positioned coaxially therewith for discharging a reactor scouring medium therein.

27. The apparatus of claim 26 which further comprises a second conduit sealingly extending into said cylindrical oxygen injection chamber and positioned coaxially therewith and with said first conduit for discharging auxiliary fuel therein.

28. The apparatus of claim 27 which further comprises a heat shield disposed within said cylindrical oxygen injection chamber between said annular opening therein and said closed forward end thereof.

29. The apparatus of claim 23 which further comprises an internal liner formed of corrosion resistant material disposed in said third annular plenum chamber.

30. The apparatus of claim 29 wherein said annular slot and said radial slots in said cylindrical titanium tetrachloride gas injection chamber are angled towards said rearward end of said injection chamber.